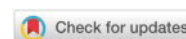


ELEVATED MATERNAL BMI AMONG WOMEN WITH SUCCESSFUL VAGINAL BIRTH AFTER CESAREAN: EXPERIENCE FROM A 9-YEAR SINGLE-CENTER SERIES

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Abstract: Maternal obesity is commonly associated with a reduced probability of vaginal birth after cesarean (VBAC), yet body mass index (BMI) alone does not determine the outcome of a trial of labor after cesarean (TOLAC). This study describes the BMI profile of women who achieved VBAC in a tertiary referral center, with particular attention to the representation of overweight and obesity among successful cases.

Objective: To describe the distribution of maternal BMI among successful VBAC cases and to assess the representation of elevated BMI, including severe obesity, within this group.

Materials and methods: A retrospective descriptive case series included 149 successful VBAC deliveries recorded between 2016 and 2025 at the University Hospital "Maichin Dom", Sofia. BMI was documented in 118 women. Patients were grouped as BMI <25 kg/m², 25.0–29.9 kg/m² and ≥30 kg/m². Obesity was additionally stratified into classes I, II and III. The study describes the characteristics of women who achieved VBAC and does not compare them with women who had a failed TOLAC.

Results: Mean BMI was 28.3 ± 6.6 kg/m² (range 19.0–64.0). Normal BMI was present in 43/118 women (36.4%), overweight in 37/118 (31.4%) and obesity in 38/118 (32.2%). Consequently, 75/118 successful VBAC cases (63.6%) occurred in women with BMI ≥25 kg/m². Among women with obesity, 26 (68.4%) had class I, 7 (18.4%) class II and 5 (13.2%) class III obesity.

Conclusion: Elevated BMI was common rather than exceptional among women who achieved VBAC in this series. Successful vaginal birth was observed across a wide BMI range, including BMI ≥40 kg/m². These findings should not be interpreted as BMI-specific TOLAC success rates, but they illustrate why BMI is better used as one component of individualized counseling than as a stand-alone exclusion criterion.

Keywords: TOLAC, VBAC, body mass index, obesity, overweight, cesarean delivery

Field: Medical Sciences and Health

1. INTRODUCTION

Counseling regarding mode of delivery after a previous cesarean section is often based on factors that alter the expected likelihood of vaginal delivery. Maternal BMI is one of these, but its clinical interpretation is not unambiguous. A lower likelihood of VBAC among obese women does not mean that vaginal delivery is unusual or unattainable for a particular woman with a high BMI. Current prognostic models continue to include BMI among the factors associated with the likelihood of successful VBAC. The updated model by Grobman et al. (2021) retains BMI as a prognostic factor, while excluding race and ethnicity from the assessment. The systematic review by Deng et al. (2022) also shows that BMI is among the commonly used predictors of successful VBAC. Lee et al., analyzing over four million deliveries after a previous cesarean section in the United States, found a progressive decrease in vaginal delivery rates with increasing BMI, while previous vaginal delivery significantly modified this relationship. Against this background, focusing only on women who achieved VBAC offers a different perspective. Rather than asking how often TOLAC is successful in each BMI category, the present study addressed a narrower question: how common is elevated BMI among women who have already achieved VBAC?

Objective: To characterize maternal BMI among women with successful VBAC at a tertiary center and to assess the representation of overweight and obesity, including severe obesity, in this cohort.

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2. MATERIALS AND METHODS

Clinical records of 149 women with successful vaginal birth after a previous cesarean delivery between 2016 and 2025 were reviewed. All deliveries occurred at the University Hospital of Obstetrics and Gynecology "Maichin Dom", Sofia, a tertiary obstetric referral center. The analysis presented here was restricted to maternal BMI and was designed as a descriptive case series.

BMI data were available for 118 women (79.2% of the cohort). For analysis, BMI was categorized as $<25 \text{ kg/m}^2$, $25.0\text{--}29.9 \text{ kg/m}^2$ and $\geq 30 \text{ kg/m}^2$. Women with BMI $\geq 30 \text{ kg/m}^2$ were further divided into class I ($30.0\text{--}34.9 \text{ kg/m}^2$), class II ($35.0\text{--}39.9 \text{ kg/m}^2$) and class III obesity ($\geq 40 \text{ kg/m}^2$). Continuous data are presented as mean $\pm$ standard deviation and range; categorical data as number and percentage.

This study includes only women with successful VBAC, not all women who attempted TOLAC. Women whose TOLAC ended in intrapartum cesarean delivery are therefore not represented. For this reason, TOLAC success rates were not compared between BMI groups, and the effect of BMI on TOLAC outcomes was not assessed.

3. RESULTS

Among the 118 women with documented BMI, the mean value was $28.3 \pm 6.6 \text{ kg/m}^2$, with a wide range from 19.0 to 64.0 kg/m^2 . Only 43 women (36.4%) were in the normal-weight category. Thirty-seven (31.4%) had overweight and 38 (32.2%) had obesity. Therefore, women with BMI $\geq 25 \text{ kg/m}^2$ accounted for 63.6% (75/118) of all successful VBAC cases with available BMI data.

Table 1. Distribution of successful VBAC cases according to maternal BMI

BMI category	n	%
Normal weight ($<25 \text{ kg/m}^2$)	43	36.4
Overweight ($25.0\text{--}29.9 \text{ kg/m}^2$)	37	31.4
Obesity ($\geq 30 \text{ kg/m}^2$)	38	32.2
Overweight + obesity ($\geq 25 \text{ kg/m}^2$)	75	63.6

Source: authors' research

The obese subgroup was not limited to mild obesity. Of the 38 women with BMI $\geq 30 \text{ kg/m}^2$, 26 (68.4%) had class I obesity, 7 (18.4%) had class II obesity and 5 (13.2%) had class III obesity. Thus, 12 women with BMI $\geq 35 \text{ kg/m}^2$ and five with BMI $\geq 40 \text{ kg/m}^2$ achieved vaginal birth after cesarean in the observed cohort.

Table 2. Distribution of obesity classes among successful VBAC cases with BMI $\geq 30 \text{ kg/m}^2$

Obesity class	n	% within obesity group
Class I ($30.0\text{--}34.9 \text{ kg/m}^2$)	26	68.4
Class II ($35.0\text{--}39.9 \text{ kg/m}^2$)	7	18.4
Class III ($\geq 40 \text{ kg/m}^2$)	5	13.2

Source: authors' research

The distribution is notable because the cohort was defined by outcome: every woman included had already achieved VBAC. Accordingly, the finding does not indicate equal success rates across BMI groups. It demonstrates instead that elevated BMI, including severe obesity, was substantially represented among successful vaginal births after cesarean in routine tertiary-care practice.

4. DISCUSSION

The main finding of this study was that elevated BMI was common among women who achieved successful VBAC. Most women with available BMI data had a BMI $\geq 25 \text{ kg/m}^2$, almost one third had obesity, and successful vaginal birth was observed even among women with severe obesity. These findings provide an important perspective, as obesity is usually considered a negative predictor of VBAC. The association between increasing BMI and a lower probability of successful VBAC is well established. Earlier studies by Durnwald et al. and Hibbard et al. showed that VBAC success decreased as BMI increased, and BMI was later included in several prediction models. However, our study could not confirm

or challenge this association because women with failed TOLAC were not included. Instead, our findings show that elevated BMI, including severe obesity, was not uncommon among women who achieved VBAC. Recent evidence also suggests that BMI should not be considered in isolation. In the large study by Lee et al., the rate of vaginal birth after TOLAC decreased from 66.7% in women with BMI <30 kg/m² to 48.1% in women with BMI 40–69.9 kg/m² among those without a previous vaginal delivery. However, among women with a previous vaginal delivery, the corresponding rates were considerably higher: 81.4%, 74.7%, and 67.3%. These findings suggest that the effect of BMI on the probability of VBAC is strongly influenced by the woman's obstetric history. A recent Canadian population-based study showed another important finding. Women with obesity were not only less likely to achieve VBAC, but also less likely to plan or attempt TOLAC. Thus, the lower VBAC rate among women with obesity may reflect both a lower chance of successful TOLAC and a lower likelihood of attempting it.

The negative effect of high BMI on labor and delivery appears to be multifactorial. Studies have shown slower cervical dilatation, a longer first stage of labor, and a greater need for oxytocin among women with obesity. Earlier studies suggested that these differences could be related to reduced myometrial contractility. However, more recent data did not demonstrate weaker uterine contractions and suggested that slower labor progress may also be related to differences in the structure and biomechanical properties of the cervix. The use and required dose of oxytocin also tend to increase with BMI. Other factors that are more common among women with obesity, including fetal macrosomia, gestational diabetes, hypertensive disorders, and the need for labor induction, may further reduce the probability of successful VBAC. Difficulties with intrapartum fetal monitoring may also contribute to a higher rate of intrapartum cesarean delivery.

Safety remains an important consideration when counseling women with obesity about TOLAC. Jude et al. reported a higher rate of composite adverse maternal outcomes among women with obesity undergoing TOLAC compared with planned repeat cesarean delivery. Recent expert reviews emphasize that the risks associated with unsuccessful TOLAC should be balanced against the risks of repeat cesarean delivery. The FIGO recommendations published in 2025 identify BMI <30 kg/m² as a favorable factor for VBAC success but do not consider obesity an absolute contraindication to TOLAC. Therefore, the decision should not be based on BMI alone, but on the overall obstetric profile and the availability of appropriate intrapartum monitoring and emergency cesarean delivery.

Our cohort illustrated this point particularly well. Five women with class III obesity achieved successful VBAC. This finding does not mean that TOLAC has a high success rate or is equally safe in all women with BMI ≥40 kg/m². However, it demonstrates the limitations of using a specific BMI threshold as a stand-alone criterion for patient selection. Previous vaginal birth, the indication for the previous cesarean delivery, cervical status, spontaneous onset of labor, fetal weight, maternal comorbidities, and the resources of the maternity unit may all influence the probability of successful VBAC.

The main limitation of this study was its design. The database included only women who achieved successful VBAC and did not include all women who attempted TOLAC. Therefore, BMI-specific success rates, the risk of failed TOLAC, and the association between BMI and uterine rupture could not be calculated. In addition, BMI data were unavailable for 31 of the 149 women. The results should therefore be interpreted as a description of the BMI distribution among women who achieved VBAC rather than as an assessment of the probability of successful TOLAC.

5. CONCLUSION

Women with elevated BMI constituted a substantial proportion of successful VBAC deliveries in this 9-year tertiary-center series. Almost two thirds of women with documented BMI had overweight or obesity, and successful VBAC occurred in all obesity classes, including class III. These findings do not contradict the lower probability of VBAC associated with increasing BMI, but show that successful VBAC can occur even in women with severe obesity. Therefore, BMI should be considered together with other obstetric factors when counseling women about TOLAC, rather than being used alone as a reason to exclude TOLAC.

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